

**APPENDIX 2: REPLACEMENT SPECIFICATION**

Please delete the prior Specification from page 1, line 1 to page 6, line 28 of the filed application and replace with the following clean version of text:

**Technical Field**

This invention relates to a novel wrapped yarn, which has as its core a spandex (polyurethane based elastomeric) 520 denier yarn. Such a core yarn is commercially available under the registered trademark "LYCRA®," which is owned by Invista North America S.á.r.l.. Throughout this specification, this trademark will be used to identify such a core yarn.

This invention relates to the yarn for knitting socks, especially, the polyurethane based LYCRA® Soft 520 denier for the prevention of twist and maintenance of elasticity after processing.

Double covering of the polyurethane based LYCRA® Soft 520 denier yarn with nylon 70D/24F/1 high speed textured, is accomplished by applying S twist and Z twist at the same time to prevent twisting, and maintaining the elongation rate of the Lycra Soft 520 denier yarn at proper value while utilizing the maximum restitution.

When nylon 70D/24F/1 high speed textured yarn(20, 30) is wound first in S twist(842.8TPM) and second in Z twist(1960.8TPM ), the LYCRA® Soft 520 denier yarn, which is the core yarn, gives the elongation rate(tensile elongation 440.9%, permanent elongation 7.2%, restitution rate 98.2%). This is lower than the original value.

**Background of the Invention**

To produce polyurethane based LYCRA® Soft 520 denier yarn double covered with nylon.

**Disclosure****Technical Problem**

Generally speaking, core yarn used for producing socks has been used with special yarn feeding devices which incorporate anti-slip devices for polyurethane yarn. This is possible without any specific processing, due to the high elasticity.

The socks produced in this method present the characteristics of the LYCRA® Soft 520 denier yarn which has a stronger restitution and elongation than common yarn.

However, sometimes it is necessary for the socks made with LYCRA® Soft 520 denier yarn to be restricted in their elongation rate, especially for leisure – sports activity socks. This has not been possible in conventional ways.

In addition, due to the structural characteristics of the elastic thread feeding device of common sock knitting machines, it is difficult to design knitting with LYCRA® Soft yarn which is liable to slip at feeding.

The technical goal of this invention is to produce polyurethane based LYCRA® Soft yarn double covered with nylon, for the prevention of twisting and maintenance of elasticity after processing.

**Technical Solution**

In this invention, it is possible to replace the said nylon high speed textured yarn with any one of polyamide, polyester, or polypropylene

fiber which are filament yarn or long staple, or with a long staple copolymer yarn.

As described hereinabove, double covering the polyurethane based LYCRA® Soft 520 denier yarn with nylon 70D/24F/1 high speed textured yarn(20, 30) is accomplished by applying S twist and Z twist at the same time to prevent twisting, while maintaining the elongation rate of the LYCRA® Soft 520 denier yarn at proper value and utilizing the maximum restitution.

When the said nylon 70D/24F/1 high speed textured yarn(20, 30) is wound first in S twist(842.8TPM) and second in Z twist(1960.8TPM ), the LYCRA® Soft 520 denier yarn, which is the core yarn, gives the elongation rate(tensile elongation 440.9%, permanent elongation 7.2%, restitution rate 98.2%). This is lower than the original value.

The process of this invention accomplishes the strength of sock parts in accordance with the shape of leg using LYCRA® Soft 520 denier yarn. The process includes the feeding speed of the yarn into the knitting machine with the double covered yarn roller, which is provided in most machines, and the stepping motor.

Finished socks, as well as similar products, are heat treated(approximately for 40-50 minutes at 90-100 °C) after dyeing in order to give high elasticity to the double covered LYCRA® Soft 520 denier yarn in accordance with this invention, and to strengthen the compression property of the product by contracting the nylon 70D/24F/1 high speed textured yarn.

In addition, the surface of the nylon 70D/24F/1 high speed textured yarn covering the LYCRA® Soft 520 denier yarn becomes smoother by the heat contraction. This gives better wearing sense and structural stability of the product, by providing the elasticity and compression better than a compress.

As for the knitting method, the core yarn produced by the art of this invention is not only used in a specific part of socks but is used in all the parts of socks except the toe and heel. The partial compression according to the shape of leg is controlled with the double covered yarn roller and the stepping motor. These are installed at most sock knitting machines. By implementing high elastic multi-stage compressive knitting technology, blood in the foot is pressed upward promoting circulation as well as protection of ankles. This also prevents and absorbs sweat while enhancing durability.

The fruit of this invention can be maximized by incorporating proper management of production processes ( including knitting ) and after process treatments.

### **Advantageous Effects**

By this invention, the LYCRA® Soft yarn double covered with nylon high speed textured yarn can be protected from twisting while maintaining high elasticity. Therefore, the socks knitted with said yarn provide elasticity better than a compress, soft restitution, soft wearing sense, and comfort.

**Description of Drawings**

Figure 1 illustrates the LYCRA® Soft 520 denier yarn double covered by the art of this invention.

<Numbers and Symbols of the Drawings>

10.... LYCRA® Soft Yarn 20,30....Nylon 70D/24F/1 High Speed Textured Yarn

**Best Mode**

The most desirable shape of the embodiment of this invention is the LYCRA® Soft 520 denier yarn, covered first by S twist and second by Z twist with nylon 70D/24F/1 high speed textured yarn.

**Mode for Invention**

The double covered LYCRA® Soft yarn of this invention is characterized by the polyurethane based LYCRA® Soft 520 denier yarn double covered with nylon high speed textured yarn, to prevent twisting while maintaining elasticity after processing.

And, the said nylon high speed textured yarn is characterized by nylon 70D/24F/1 high speed textured yarn.

And, the said nylon high speed textured is characterized by being replaced with any one of filament yarn, polyamide yarn, polyester yarn, or polypropylene yarn.

And, the said double covering is characterized by first and second covering by S twist.

And, the said double covering is characterized by S twist first and then Z twist second.

And, the said double covering is characterized by Z twist first and then S twist second.

And, the said double covering is characterized by first and second covering by Z twist.

Herein below, the invention is described in detail referring to the drawings;

Figure 1 illustrates an embodiment of a core yarn double covered with nylon, comprising the core yarn(10) and nylon high speed textured yarn(20, 30).

A core yarn(10) is the material of fabric, which is the polyurethane based LYCRA® Soft 520 denier yarn in this invention.

Nylon high speed textured yarn(20, 30) has superior elasticity and contraction by heat treatment, which is the nylon 70D/24F/1 high speed textured yarn in this invention.

Figure 1 illustrates the LYCRA® Soft 520 denier yarn(10) double covered with nylon 70D/24F/1 high speed textured yarn(20, 30) by S twist or Z twist, to prevent twisting and to maintain elasticity after processing.

The said double covering may be carried out in such a manner that S twist covers first then Z twist covers next, or in reverse.

Or, said double covering may be comprised of S twist or Z twist only for both first and second covering.

In this invention, the said nylon high speed textured yarn may be replaced with filament yarn, or any one of polyamide, poly ester, polypropylene which is long staple, or with long staple copolymer yarn.

As described hereinabove, double covering the polyurethane based LYCRA® Soft 520 denier yarn with nylon 70D/24F/1 high speed textured yarn(20, 30) is accomplished by applying S twist and Z twist at the same time to prevent twisting, while maintaining the elongation rate of the LYCRA® Soft 520 denier yarn at proper value and utilizing the maximum restitution.

When the said nylon 70D/24F/1 high speed textured yarn(20, 30) is wound first in S twist(842.8TPM) and second in Z twist(1960.8TPM ), the LYCRA® Soft 520 denier yarn, which is the core yarn, gives the elongation rate(tensile elongation 440.9%, permanent elongation 7.2%, restitution rate 98.2%). This is lower than the original value.

The process of this invention accomplishes the strength of sock parts in accordance with the shape of leg using LYCRA® Soft 520 denier yarn. The process includes the feeding speed of the yarn into the knitting machine with the double covered yarn roller, which is provided in most machines, and the stepping motor.

Finished socks, as well as similar products, are heat treated(approximately for 40-50 minutes at 90-100 °C) after dyeing in order to give high elasticity to the double covered LYCRA® Soft 520 denier yarn in accordance with this invention, and to strengthen the compression property of the product by contracting the nylon 70D/24F/1 high speed textured yarn.

In addition, the surface of the nylon 70D/24F/1 high speed textured yarn covering the LYCRA® Soft 520 denier yarn becomes smoother by the heat contraction. This gives better wearing sense and structural stability of the product, by providing the elasticity and compression better than a compress.

As for the knitting method, the core yarn produced by the art of this invention is not only used in a specific part of socks but is used in all the parts of socks except the toe and heel. The partial compression according to the shape of leg is controlled with the double covered yarn roller and the stepping motor. These are installed at most sock knitting machines. By implementing high elastic multi-stage compressive knitting technology, blood in the foot is pressed upward promoting circulation as well as protection of ankles. This also prevents and absorbs sweat while enhancing durability.

As set forth hereinabove, this invention has been described referring to the embodiments illustrated in the drawings, however, such descriptions are only exemplary and explanatory, and it is obvious that anyone who has common knowledge in the field of art of this invention will be able to modify, change, or add in a wide variety not departing from the spirit and the scope of this invention as set forth in the appended claims, therefore, such modifications, changes, or additions should be considered to be covered by and included in the claims of this invention.



**Industrial Applicability**

The process of this invention accomplishes the strength of sock parts in accordance with the shape of leg using LYCRA® Soft 520 denier yarn. The process includes the feeding speed of the yarn into the knitting machine with the double covered yarn roller, which is provided in most machines, and the stepping motor.

Finished socks, as well as similar products, are heat treated (approximately for 40-50 minutes at 90-100 °C) after dyeing in order to give high elasticity to the double covered LYCRA® Soft 520 denier yarn in accordance with this invention, and to strengthen the compression property of the product by contracting the nylon 70D/24F/1 high speed textured yarn.

In addition, the surface of the nylon 70D/24F/1 high speed textured yarn covering the LYCRA® Soft 520 denier yarn becomes smoother by the heat contraction. This gives better wearing sense and structural stability of the product, by providing the elasticity and compression better than a compress.

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